

PerGeos Software version 2023.1

Release notes

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Introduction

This document covers the most important new features, improvements, and changes in this version of Thermo Scientific™ PerGeos Software. In addition, you will find a list of new Xtras including video tutorials, recipes, and workflows which have been published on pergeos.com since the previous release.

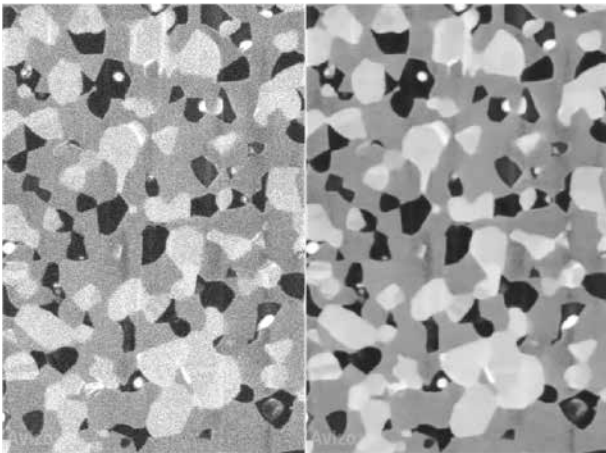
We value your feedback. If you encounter any problems or have any suggestions for improvement, do not hesitate to [contact us](#).

Deep Learning Denoising

Noise2Void

Denosing modules help you run faster acquisitions and digitally compensate for missing information.

The Noise2Void approach is an unsupervised denoising method that does not require noisy image pairs or clean target images. Therefore, a model can be directly trained with this method using the images you need to denoise without a ground truth. A new deep learning module named *DL Training - Noise to Void 2D* is now available to train a model using this pipeline. Once trained, the denoising model can be used with the existing module of inference named *Deep Learning Prediction*.



Noise2Void Deep Learning denoising applied to EM image of a SOFC sample.

OS requirements: Windows only

Licensing: No restriction

Meshing

We have improved the meshing workroom, as well as the **Generate Tetra Mesh** module, by providing granular control in the mesh making and by using more self-explanatory language for existing functionalities. The speed and robustness of the meshing process have been improved. Further, the XWind extension is now available on Linux as well as Windows.

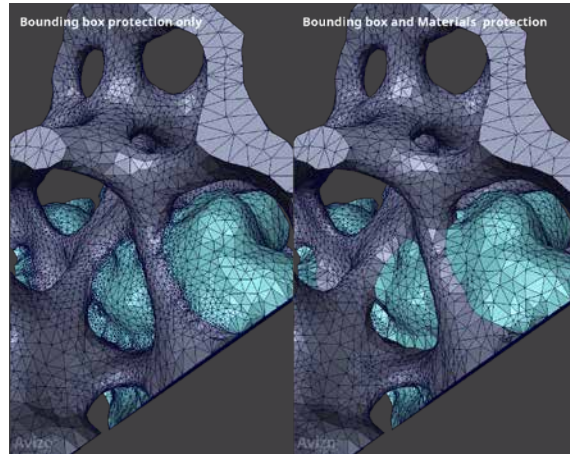
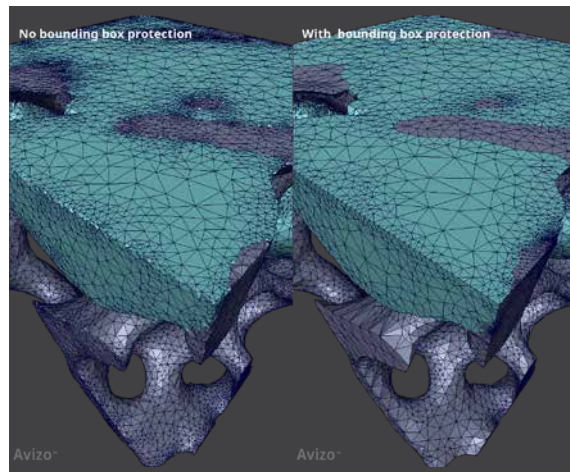
The **Direct Approach** generates the tetrahedral mesh directly from a label image and corresponds to what was previously called *Fast Meshing*.

The newly introduced **Polygonal Approach** uses a surface (triangle) mesh as an intermediate step for generating the tetrahedral mesh. It was previously available when the *Fast Meshing* option was not activated.

Direct Approach uses weight information to avoid staircase effects originating from the discrete voxel representation and to produce smoother meshes. When this option is selected, the algorithm will either use pre-existing weights, if any, or compute its own.

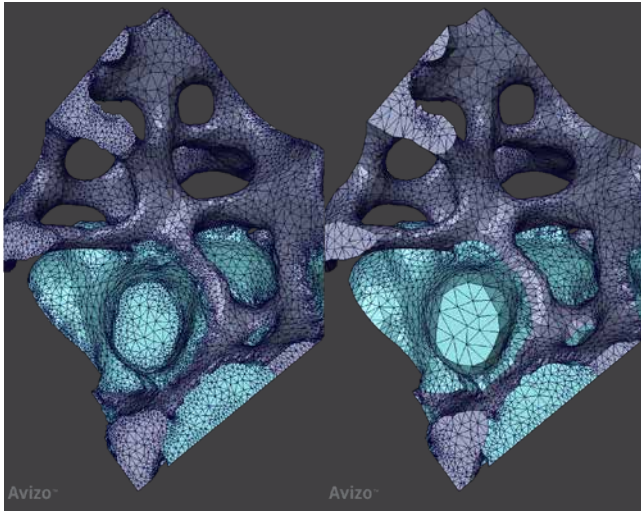


When using **Direct Approach**, you can apply different options for feature protection. The **Bounding Box** option corresponds to the default approach used in the previous implementation. In addition, it is now also possible to activate protection of the interfaces between materials to improve the accuracy of the boundaries. These different protections lead to increased computation time and may result in oversampling on some edges and sometimes produce non-orientable faces that can be problematic for some solver applications. It is therefore possible to select the type of protection desired.



The Polygonal Approach uses a surface mesh as an intermediate step. This surface is produced by the Generate Surface module or provided explicitly as an advanced parameter.

A new edge size parameter is now accessible in the advanced settings. This parameter can be used, for instance, to correct artifacts such as an umbrella effect, as in this example:



OS requirements:

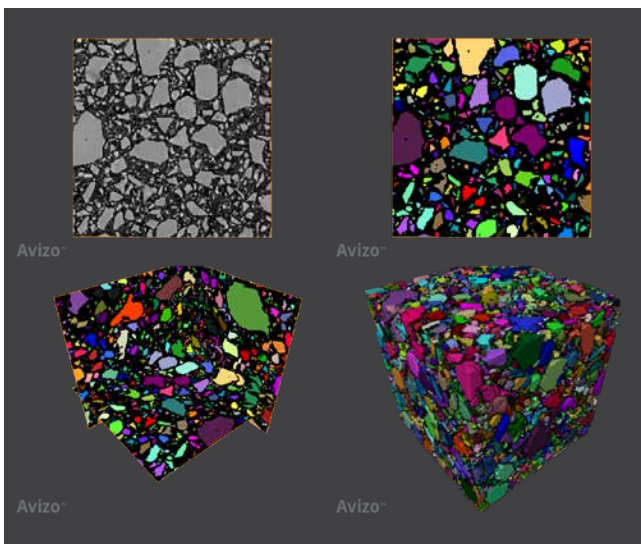
All supported platforms (previously only on Windows)

Licensing: No restriction

New Modules

Hierarchical Watershed Segmentation

This module implements the watershed algorithm, enabling segmentation of images into meaningful regions. The traditional challenge with watershed segmentation is the adjustment of the parameter controlling the fusion of adjacent regions. Starting from either the local minima or maxima of the input image, the first execution of this module computes a hierarchy of catchment basins simulating water flooding in the landscape and stores it in



Hierarchical watershed segmentation applied to a 3D microCT volume of a rock sample.

a tree structure. Once this structure is computed, you can quickly adjust the threshold criterion that controls how adjacent regions are being merged and interactively identify the optimal trade-off.

This module replaces a previous implementation from the **Hierarchical Watershed** module, which is now discontinued.

OS requirements: All supported platforms

Licensing: No restriction

Remove Islands

This module supports post processing of label images by removing small regions, or “islands.” An island is defined as a connected component containing a number of voxels less than or equal to a specified value. Islands can be relabeled to the predominant neighboring label, depending on the number of neighboring labels and the fraction of surface of interface shared with these neighbors.

OS requirements: All supported platforms

Licensing: No restrictions

Colocalization

This module detects colocalized particles of two binary images. The result is a binary image containing the union of only overlapping particles.

OS requirements: All supported platforms

Licensing: No restrictions

Petrophysics Extension

Previously, molecular diffusivity, formation factor, and thermal conductivity computation were only available on Windows. All tools from the Petrophysics extension are now also available on Linux.

OS requirements: All supported platforms

Licensing: Petrophysics extension

Compatibility Notes

Hierarchical Watershed

This module will be discontinued in version 2023.1 and replaced by the **Hierarchical Watershed Segmentation** module. Previous projects using the deprecated module will still be usable, but a warning will be issued. We strongly suggest updating them with the new module.

End of Support

CentOS7 discontinued since 2022.1

As previously announced, PerGeos Software 2022.1 was the last official maintained releases on CentOS7. While you can still use PerGeos Software 2022.1 on CentOS7, support and bug fixes will no longer be provided.

It has been replaced by Ubuntu 20.04 as the officially supported Linux platform. We encourage you to transition to the Ubuntu 20.04 to receive full support.

Operating Systems

PerGeos Software version 2023.1 runs on:

- Microsoft Windows 10 (64-bit).
- Microsoft Windows 11 (64-bit)
- Linux x86 64 (64-bit) on Intel64/AMD64 architecture with Ubuntu 20.04 (desktop)

Our products are tested on the following configurations:

Platform	GPU	Driver number
Windows 10	NVidia Tesla M60	512.78
Windows 11	NVidia RTX A4500	528.02
Ubuntu-20.04	NVidia T1000	525.105.17

Resolved Issues

Name	ID	Description
2D-Histogram Segmentation	AA-24893	2D-Histogram Segmentation module is now handling well 2D input data when 3D interpretation is selected.
Convert Image Type	AA-27809	32-bit data with negative values has been managed to avoid failure when converting it to 8-bit or 16-bit label.
Compute REV	AA-28292	Compute REV is now working as expected with gray image input.
Core Profile	AA-28307	Logs are now correctly loaded.
Generate Tetra Grid	AA-28042	The number of materials is now limited to 256 for tetra grid generation.
Interactive Overlay Threshold	AA-28255	The red overlay is now displayed correctly.
Ortho Slice (LDA)	AA-28333	When the adjust view option is checked ON and the input data is a Multi-Channel Field or SMS, there is no longer View All when changing channels selector.
Ortho Views	AA-2886	Camera links are now removed when entering in Ortho Views mode to avoid misbehavior in display.
Pore Network Model Extraction	AA-28108	Now, when the temporary folder does not have writing permissions, an error message is shown and the computation is aborted.
Tiff reader	AA-27919	2D Tiff file size is now well handled.
System Requirements	AA-28538	The CUDA version is now described in the System Requirements.

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